Operating Instructions

for

Hand-held Measuring Devices with Integrated Pressure Sensors

Model: HND-P123

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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.
The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EWG-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:

- Hand-held Measuring Devices with Integrated Pressure Sensors
  model: HND-P123
- Operating Instructions

4. Regulation Use

Any use of the Hand-held Measuring Devices with Integrated Pressure Sensors, model: HND-P123, which exceeds the manufacturer's specification may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The highly precise KOBOLD manual pressure measuring devices HND-P123 are measuring devices with integrated pressure sensors. They have two pressure measurement inputs on the top of the housing, which are connected to the measuring points by means of stable metal connections and plastic hoses that are available as accessories. Numerous measuring ranges in the overpressure and underpressure range are available for various measurement tasks, such as differential pressure measurement. In addition to pressure display, these first-rate, compact, universally applicable measuring units offer additional functions such as minimum/maximum value memory, a hold function, tare function, automatic self-shut-off, or zero point offset. The devices with an expanded spectrum of functions also have a logger function, a peak value memory, minimum/maximum alarm, an adjustable measuring cycle, and averaging.

6. Electrical Connection

6.1 Mains Operation with Power Supply

Warning: When using a power supply please note that operating voltage has to be 10.5 to 12 V_{DC}. Do not apply overvoltage!!
Cheap 12 V-power supplies often have excessive no-load voltage. We, therefore, recommend using regulated voltage power supplies. Trouble-free operation is guaranteed by our power supply HND-Z002.

Prior to connecting the power supply to the mains make sure that the operating voltage stated at the power supply is identical to the mains voltage.

7. Operation / Configuration / Adjustments

7.1 General

7.1.1 Safety Requirements

This device has been designed and tested in accordance with the safety regulations for electronic devices.
However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using the device.

1. Trouble-free operation and reliability of the device can only be guaranteed if the device is not subjected to any other climatic conditions than those stated under *9 Technical Information*.
2. Device and sensors have to be handled with care (don't throw, hit, etc.). Protect plugs and sockets from soiling.
3. If the device is transported from a cold to a warm environment condensation may cause in a failure of the function. In such a case make sure the device temperature has adjusted to the ambient temperature before trying a new start-up.
4. If device is to be connected to other devices (e.g. via serial interface) the circuitry has to be designed most carefully. Internal connection in third party devices (e.g. connection GND and earth) may result in not-permissible voltages impairing or destroying the device or another device connected.

Warning: If device is operated with a defective mains power supply (e.g. short circuit from mains voltage to output voltage) this may result in hazardous voltages at the device (e.g. at sensor socket or interface).

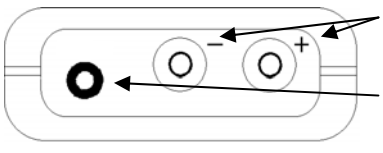
5. If there is a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting.

Operator safety may be a risk if:

- there is visible damage to the device
- the device is not working as specified
- the device has been stored under unsuitable conditions for a longer period of time.

In case of doubt, please return device to manufacturer for repair or maintenance.

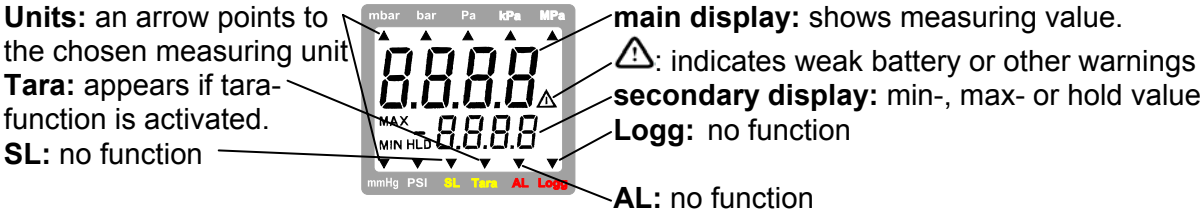
7.1.2 Connections



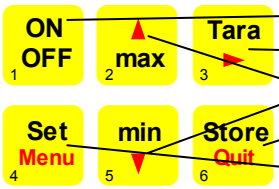
Connection for pressure tubes: „+“ = higher pressure, „-“ = lower pressure
Interface: Connection for el. isolated interface adapter (see. chapter *7.6 The Serial Interface*)

The mains adapter socket is located at the left side of the device.

7.1.3 Display


Units: an arrow points to the chosen measuring unit
Tara: appears if tara-function is activated.
SL: no function
mbar bar Pa kPa MPa
MAX
MIN HLD
mmHg PSI SL Tara AL Logg
main display: shows measuring value.
: indicates weak battery or other warnings
secondary display: min-, max- or hold value
Logg: no function
AL: no function

When switching on the device and a zero point adjustment was carried out it shows shortly „nuLL Corr“.



On-/Off-Switch

Tara: Calling of tara function, zero point adjustment

min/max: Showing the min- resp. max-memory in sec. display

Store/Quit: Calling of hold function

Set/Menu: Calling of configuration

Max Memory: Pressing ´max´ (key 2) shows the maximum of the measured values. Pressing it again hides it. To clear the max memory press key ´max´ for >2 seconds.

Min Memory: Pressing ´min´ (key 5) shows the minimum of the measured values. Pressing it again hides it. To clear the min memory press key ´min´ for >2 seconds.

Hold Function: By pressing ´Store/Quit´ (key 6) the last measuring value will be held in the secondary display. Pressing it again hides it.

Tare Function: By pressing ´Tara´ (key 3) the display will be set to 0. All measurings from then on will be displayed relatively to the set tare value. When tara function is activated, the arrow "Tara" appears in the display. To deactivate tare function press ´Tara´ for >2 seconds.

Please Note: Activating/deactivating tara clears the max- & min-memories.

Zero-Point Adjustment: If there is no pressure applied to the pressure ports the device will display 0. If there is a permanent deviation (and device is operated under steady conditions), a permanent zero point adjustment can be carried out. To carry out the adjustment press key 3 for 5 seconds. (Please note: A zero-point adjustment can only be carried out if the difference between the value on display and the value calibrated on site is less than 2 %! E.g. for the measuring range of –10.0 ..+350.0 mbar, =>zero-point adjustment up to 7.0 mbar possible). To recall the manufacturer`s calibration press button 3 for approx. 7 seconds.

Note: If a zero-point adjustment was carried out, this will be signalled by the short displaying of „NuLL Corr“ when switching on the device.

7.2 Configuration

To change device settings, press ***Menu*** (key 4) for 2 seconds. This will call the configuration menu.
Pressing key ***Menu*** jumps between the parameters.
The parameters can be changed with ▲ (key 2) or ▼ (key 5).
Quit (key 6) finishes the configuration and returns to standard measuring operation.

7.2.1 Unit: Coice Of The Display Unit

Choose the desired display unit, the refering unit is displayed by means of a functional arrow in the display. The selection is permanently stored in the device, therefore after power on the unit will instantly reapear. The choice depends on the used sensor.
The unit [m] =mH_2O is just supported by devices with [m] printed below the display

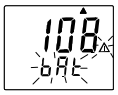
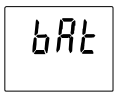
7.2.2 P.oFF: Auto Power Off Time

The device will be automatically switched off if no key is pressed/no interface communication takes place for the time of the power off time. The power off time can be set to values between 1 and 120 min. It can be completely deactivated by setting the paramter to ‚P.oFF = oFF“.

7.2.3 Adr: Base Address of Interface

Up to 10 devices of the HND- handheld-family can be connected to a serial interface at once. To get access to each device the base addresses of the devices have to be different. For example choose 01 for the first, 11 for the second device and so on.

7.3 Error And System Messages

Display	Meaning	What to do?
	Low battery power, device will only continue operation for a short period of time	Replace battery
	Battery empty	Replace battery
	Mains operation without battery: wrong voltage	Check power supply, replace it when necessary
No display or confused characters, device does not react on keypress	Battery empty	Replace battery
	Mains operation without battery: wrong voltage or polarity	Check power supply, replace it when necessary
	System error	Disconnect battery and power supplies, wait shortly, then reconnect
	Device defective	Return to manufacturer for repair
Err.1	Measured value above allowable range	Check: pressure above 350 mbar? -> measuring value to high
	Sensor defective	Return to manufacturer for repair
Err.2	Measured value below allowable range	Check: pressure below -10 mbar? -> measuring value to high
	Sensor defective	Return to manufacturer for repair
Err.4	Value is too low to be displayed, tara is set	Check: display below -2000 (tara?)?
Err.9	Measured value far out of allowable range	Check: pressure not within sensor range?
Err.7	System error	Return to manufacturer for repair

7.4 Pressure Connection To The Sensors

- **For measurements of over pressure (-10.0 mbar...350.0 mbar):**

Connect plastic tube with internal dia of 4 mm to pressure port "+". Port "-" will not be used!

- **For measurements of under pressure (-350.0 mbar...0.0 mbar):**

Plug the tube to pressure port "-". The measuring range covers then -350.0 to 0.0 mbar.

Note: All values are displayed now as positive values. No minus sign will be shown.

Example: it is possible to messure under pressure down to -350.0 mbar, the display shows then the value 350.0 (no minus sign).

- **For measurements of pressure differences:**

Connect both plastic tubes with an internal dia of 4 mm to pressure port "+" and "-"; make sure to apply higher pressure to port "+".

7.5 Calibration Services

Calibration certificates – DKD-certificates – other certificates:
If device should be certificied for its accuracy, it is the best solution to return it with the refering sensors to the manufacturer.
Only the manufacturer is capable to do efficient recalibration if necessary to get results of highest accuracy!

7.6 The Serial Interface

By means of the serial interface and a suitable electrically isolated interface adapter (HND-Z031 or HND-Z032) the device can be connected to a computer for data transfer. With the HND-Z032 up to 5 devices of the HND- series can be connected to one interface (see also manual of HND-Z031 orHND-Z032)
To avoid transmission errors, there are several security checks implemented e.g. CRC.
The following standard software packages are available:
BUS-SW9M: 9-channel software to display the measuring values

Note: The measuring and display range values read back from the interface are always in the selected measurement unit (mbar, bar...)!

Supported functions:

Code	Name/Function	Code	Name/Function
0	Read measurement value	194	Set display unit
3	Read system state	199	Read kind of measuring of display
6	Read min memory	200	Read min display range
7	Read max memory	201	Read max display range
12	Read ID number	202	Read display range - unit
174	Clear min memory	204	Read display range – decimal point
175	Clear max memory	208	Read # of channels
176	Read min measuring range	222	Read power off time (Conf-P.oFF)
177	Read max measuring range	223	Set power off time (Conf-P.oFF)
178	Read measuring range – measuring unit	240	Reset
179	Read measuring range – decimal point	254	Program version
180	Read kind of measuring of sensor		

8. Maintenance

8.1 Battery Operation

If ⚠ and ´bAt´ are shown in the secondary display the battery has been used up and needs to be replaced. The device will, however, operate correctly for a certain amount of time. If ´bAt´ is shown in the upper display the voltage is too low to operate the device; the battery has been completely used up.

Please note: We recommend to take out battery if device is not used for a longer period of time!

9. Technical Information

Measuring range:	-10.0 to 350.0 mbar (-350.0...+350.0 mbar)
Accuracy:	±0.2 % F.S. (Hysteresis and l inearity) ±0.4 % F.S. (in the range of 0-50 °C)
Resolution:	0.1 mbar
Units:	mbar, bar, kPa, MPa, PSI, mmHg, m (switchable)
Overload:	max. 1 bar
Measurement input:	by means of two metal hose stems
Sensor:	**piezo-resistive relative pressure sensor, for air or non-corrosive and non-ionising gases and liquids, not for water!**
Display:	2 x 4- digit LC-displays
Operating temp.:	0 to +50 °C
Storage temp.:	-20 to +70 °C
Storage humidity:	0 to 95 % r.H. (non-condensing)
Output:	serial interface (via 3-pin jack, transformer on RS232 or USB optional)
Power supply:	9 V-monobloc battery (included in the scope of delivery), extern 10,5-12 V_{DC} via jack

Current consumpt.:	< 1 mA (HND-P121...), max. 3 mA (HND-P231...)
Material:	housing made of impact-resistant ABS plastic
Degree of protect.:	IP65, front
Dimensions:	142 x 71 x 26 mm (HxWxD)
Weight:	approx. 160 g

Scope of functions:
Minimum/maximum value memory
Hold function: »freezing« of the current value
Automatic-off function: 1...120 min (can be deactivated)
Zero point adjustment via keyboard possible
Tare function:
display, minimum/maximum values are set to zero
Battery change notification

10. Order Codes

Order-no.	Housing design
HND-P123	2 measuring inputs, standard

10.1 Accessories

Order-no.	Description
HND-Z002	Plug power supply unit (220/240 V, 50/60 Hz), 10,5 V/10 mA
HND-Z011	Equipment protective housing bag, nappa leather, with 1 cut-out for round sensor connection
HND-Z012	Equipment protective housing bag, nappa leather, with 2 cut-outs for round sensor connection
HND-Z021	Case with recess (275 x 229 x 83 mm)
HND-Z022	Universal case with egg crate foam (275 x 229 x 83 mm)
HND-Z023	Large case with recess (394 x 294 x 106 mm)
HND-Z031	Interface converter on RS232, galvanically isolated
HND-Z032	Interface converter on USB, galvanically isolated
HND-Z033	Adapter RS232 converter on USB- interface
HND-Z034	Windows software for setting and data read- and print-out of instruments of the HND- series with logger function
HND-Z081	Double nozzle for hose 6/4 on hose 6/4
HND-Z082	Hose clamp for hose 6/4
HND-Z083	Adapter made of brass for G ¼ internal threads on hose 6/4
HND-Z084	PVC-hose (5 bar), 6 mm external / 4 mm internal
HND-Z085	PE-hose (10 bar), 6 mm external / 4 mm internal
HND-Z086	PU-hose (9 bar), 6 mm external / 4 mm internal
HND-Z087	PA-hose (25 bar), 6 mm external / 4 mm internal

Additional accessories on request

11. Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Hand-held Measuring Devices with Integrated Pressure Sensors
model: HND-P123

to which this declaration relates is in conformity with the standards noted below:

EN 61326+A1+A2	Electromagnetic Compatibility Directive

Also the following EEC guidelines are fulfilled:

93/68/EWG, 2004/108/EG	Electromagnetic Compatibility Directive
73/23/EWG, 93/68/EWG	Low Voltage Directive

Hofheim, 01. April 2006

H. Peters
General Manager

M. Wenzel
Proxy Holder